CABLE: FCC May OK Plan

Continued

new technologies in recent years.

But among those willing to hazard an opinion, several had reservations about how the microwave technology would fare in inclement weather or amid tall buildings that might interfere with the transmission signal.

Others said that it would take more than superior technology to crack cable's video juggernaut.

"It sounds like it's a better mouse trap," said John Reidy, a media analyst with Smith Barney, Harris Upham & Co. "But new technology doesn't make an entertainment business. It's what you are offering on that technology."

For a $29.95 monthly fee, subscribers in Brighton Beach can receive up to 41 channels of video, including basic cable service and

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JOHN REIDY
Media analyst
Smith Barney, Harris Upham & Co.

such pay-television programming as Showtime and The Movie Channel, said Bernard Bossard, a partner at Cellularvision who invented the new technology

The system, which has an information-carrying capacity that rivals fiber optics, uses a part of the super-high frequency microwave band to provide a signal that is superior to cable or broadcast TV, Bossard said.

So far, he added, the company has not encountered problems acquiring video programming from suppliers.

On the telecommunications front, Bernard Walker, an associate manager at Teleport Communications Group, a New York-based company that provides telephone services to several business, said LMDS could join firms like his in facing significant resistance from the regional Bell telephone companies.

The local Bells would have to provide access to their telephone switching stations.

In supporting the new technology, the FCC is carrying out provisions in the recently passed Cable Television Act aimed at encouraging greater cable competition—thereby keeping video programming prices lower and offering Americans more viewing choices.

The FCC's proposal came a day after six members of Congress wrote FCC Chairman Alfred C. Sikes to complain that some cable television operators appear to be aggressively raising their rates before the new law takes effect.

"In what appears to be an attempt to evade the law, many cable companies are raising rates before the FCC's rate regulations are in place," the letter says.

FCC officials said that the commission may ask for rate roll backs. But one agency official told commissioners that, under the law, the FCC has no authority to order any refunds to cable subscribers.

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TECHNOLOGY FOR THE GLOBAL TELECOM NETWORK

WIRELESS

Get Ready For Cellular TV

Spectrum reallocation in the microwave band has paved the way for CellularVision—the first wireless, two-way integrated broadband delivery of services.

By Bernard Bossard

IF faster, better and cheaper telecommunications means paving a smoother electronic highway, wireless technology offers two major advantages: it bypasses hard-wired systems' limitations and avoids congestion on narrowband spectrum.

Yet, wireless communications have been hampered by wide-bandwidth, high-performance spectrum scarcity. TVs, radios, pagers, telephones and other communication devices monopolize low spectrum frequencies, while point-to-point communications clog high frequencies.

In December 1992, the Federal Communications Commission (FCC) reallocated the 27.5GHz to 29.5GHz microwave band for point-to-multipoint broadcasting distribution, laying the foundation for a new video, voice and data roadway. CellularVision (a patented technology using that roadway) provides the first wireless, two-way integrated broadband delivery of entertainment, information, transactional services and interactive video to homes and businesses. By harnessing this virtually unused spectrum segment, CellularVision provides the capacity and advantages of hard-wired fiber optic systems at one-tenth the cost.

▶ How the Technology Works

CellularVision is a multicell-configured distribution system operating in the 27.5GHz to 29.5GHz microwave band. The FCC has allocated the system 1GHz for television delivery and 1GHz for experimental data and telephone service. To provide television service within a cell, the 1GHz is used to transmit 49 video channels, each comprising a frequency-modulated (FM) signal occupying a 20MHz channel.

Two-way, or interactive, communication channels can be inserted between the video channels for transmission back on opposite polarity. This reverse polarization, or interleaving, allows simultaneous use of signals at the same frequency for two applications. It also eliminates interference in collocated cells and doubles each Gigahertz' potential. Thus, CellularVision boasts enormous capacity; the system, for example, could distribute up to 100 channels of video to the home without employing compression.

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Hardware components in each regional delivery system include one headend (satellite or terrestrial microwave) downlink facility for the central cell; one omni-directional transmitter for the central cell and additional transmitters for adjacent cells; one receiver or antenna, approximately 4.5 square inches; and one TV set-top tuner in each subscriber's home. Interactive applications require an additional transceiver.

Video programming is delivered from satellite transponders, terrestrial microwave facilities or a studio to the central cell in a regional delivery system. The headend at the central cell transmits programming via point-to-point links operating in the same 28GHz band to adjacent cells. Each cell retransmits the programming into adjacent cells without needing additional headends or other signal sources except when programming changes occur.

Within each cell, shadow areas (those not directly within the transmitting antenna's lines of sight) are covered by low-power active repeaters (200 milliwatts) or background reflectors such as buildings. CellularVision's FM-based systems can use low-cost, passive or active co-channel repeaters without distorting the system, achieving complete coverage within a cell.

▶ Quality and Capacity Achievements

Several factors contribute to the

system's high quality and capacity. Narrow bandwidths allow receiving antennas to "focus" better on the signal and reject the multi-path phenomenon, in conjunction with frequency modulation and polarization isolation. The 28GHz band allows narrowband high-gain antennas to isolate the signal from adjacent transmissions and gives small antennas the performance of much larger ones (i.e., a six-inch antenna at 28GHz performs as well as a three-foot antenna at 4GHz).

Interleaving increases capacity and reduces interference by simultaneously transmitting remote beams in a perpendicular "woven" pattern. Eliminating adjacent cell interference improves reception to studio quality and maximizes spectrum reuse. In traditional cellular systems, interference from adjacent cells only allows reuse of identical channels in one of seven cells.

In 1991, the FCC granted a permit for initial operation of point-to-multipoint television transmission to CellularVision Technologies & Telecommunications, owner and licenser of CellularVision technology. In the Brighton Beach area of Brooklyn, N.Y., CellularVision of New York currently is bringing the first-ever cellular television to many families previously unserved by cable operators. Subscribers receive wireless delivery of a basic package of 49 cable stations plus two premium channels for less than $30 per month.

As this initial program enters its second year, CellularVision is gearing up for a dramatic leap beyond mainstream video delivery, telephone and personal communications networking.

▶ CellularVision vs. Fiber Optics and Cable

The difference between CellularVision and hard-wired systems is akin to the difference between moving data through a straw *versus* a tunnel. Information transmitted by hard-wired systems first must be compressed to fit within the wires' capacity. CellularVision faces no such constraints because it travels via the airwaves from the transmission site to a home or business. This means CellularVision can provide significantly more information at better quality than cable or fiber optics.

In addition, CellularVision improves broadcast transmission clarity because it operates in the FM band. TV studios broadcast in this band, but the signal is converted to AM prior to transmission, reducing the received signal's quality. With CellularVision, the FM broadcast signal converts to AM only when it reaches the television converter box, resulting in a higher resolution picture.

▶ Wireless Horizons

Although currently used as a low-cost, high quality alternative to cable TV, this unique technology is relevant to emerging computer/communications applications. Consider, for example, the impact of a wireless, two-way integrated broadband system on telephone service. With a radius of three miles, CellularVision cells have a capacity nearly 100 times that of conventional telephone cellular. Transmitting only 10 milliwatts per channel over a three-mile radius, the system achieves better signal-to-noise ratio—and higher-quality voice transmission—than cellular phones' three-watt ratios.

With CellularVision, the lack of narrowband, high-speed telephone lines no longer inhibits telephone use expansion because the system's 1GHz of spectrum provides enormous transmitting capacity—millions of digital-quality telephone calls can be transmitted simultaneously in a multicell system. The need for and high cost of bringing fiber optic capacity to the home virtually would be eliminated.

Reallocation of the 27.5GHz to 29.5GHz microwave band has prompted telephone companies to begin thinking about new service possibilities. CellularVision, on the other hand, already is preparing to license its technology for transmitting multi-channel and interactive television and radio programming; high-definition television; video conferencing; local transactional services such as travel, banking and shopping; educational services for schools and colleges; and medical services such as high-resolution transmission of radiologic films.

As for personal communications services (PCSs) and personal communications networks (PCNs), current technology mandates voice transmission via some form of hard-wired link—presumably a fiber optic connection—between the transmitting microcell and a telco's central switch. CellularVision provides an alternative to fiber.

CellularVision's multicell configuration, established over broad geographies, would provide a complete broadband infrastructure supporting wireless voice and data transmissions. On the voice side, the system's vast 1GHz of bandwidth would allow CellularVision to serve as a clearinghouse for low-frequency PCS calls, channeling them to telephone, cellular or network distributors. In data transmission, CelluarVision's low bit errors (one part in 10 billion) allows transmission of computer data without error correction schemes.

▶ The Future

In addition to commercial video service in New York, CellularVision is using a Federal Communications Commission experimental license to demonstrate two-way video conferenceing, data transmission, microcell technology and mobile communications systems. Solid-state, low-cost transmitters and an interactive multimedia center also are under development.

CellularVision is not just a cable TV competitor but a much cheaper equivalent of wireless fiber optics. As a result, this innovative technology can supersede fiber-optic systems as the most cost-effective route to the future's electronic superhighway. ■

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